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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER
NGUYEN, DAO H

ART UNIT	PAPER NUMBER
2818	

DATE MAILED: 03/03/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/896,656	LI ET AL.	
	Examiner	Art Unit	
	Dao H Nguyen	2818	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 June 2001* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-29* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-29* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Remarks

1. In response to telephone communications with Applicant, careful consideration to the pending claims has been made, and Applicant has been found persuasive. Therefore, the Restriction Requirements in the last Office Actions have been withdrawn, and claims 1-29 now as a whole would be subject to do the search.

The rejections to claims 1-8, and 24-29 in the last Office Action are maintained, and included below along with new rejections to claims 9-23.

Claim Objections

2. Claim 12 recites the limitations "a ferroelectric polymer structure", "a first electrode layout", and "a substrate" in line 1-2, and 4. It is not clear that if these limitations are new and different from those defined in claim 9 and in line 3 of claim 12? If these are prior defined limitations, then they should be put in the form of definite article (--the ferroelectric polymer structure--, or --said ferroelectric polymer structure--, --said substrate--, for example). Appropriate correction is required.

Similarly, appropriate corrections are required for claims 13-15, and 17.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 6 and 28 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 6 and 28 recite the limitation " the ferroelectric polymer structure" on lines 3 and 2, respectively. There are insufficient antecedent basis for these limitations in the claims.

Claim Rejections - 35 U.S.C. § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth insection 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1-3, 8, 24-26 are rejected under 35 U.S.C. 103 (a) as being unpatentable over U.S. Patent No. 6,072,718 to Abraham et al. in view of the following remarks.

Regarding to claims 1 and 24, Abraham et al. discloses a polymer memory device, as shown in figures 1, 9-14, comprising:

a substrate (see column 2, lines 5-11);

a memory article disposed on the substrate, the memory article comprising:

a series of first electrodes 1-3;

an array of discrete, spaced-apart structures 9 disposed over the series of first electrodes 1-3; and

a series of second electrodes 4-6 disposed over the discrete, spaced-apart structures 9. See figure 1.

Abraham et al. neither explicitly teach that the discrete, spaced-apart structures being made of polymer, nor that the memory article being in communication to a host through a signal interface. It would have been obvious to one having ordinary skill in the art at the time the invention was made that polymer are well known polarizable ferroelectric materials used in memory device (see also U.S. Patent No. 5,927,206 to Bacon et al., ***column 5***, lines 45-57), and that a memory device must be connected to other component such as a host in order to use it, and it is inherent that such connection must be performed via a signal interface.

Regarding to claims 2, 3, and 26, Abraham et al. disclose the polymer memory device comprising all the claimed limitations, except for an area of the polymer structure in the array of discrete, spaced-apart polymer structures being greater than the product of the widths of the first and second electrodes, and for the width of the first and second electrodes being of 0.25 micron, 0.18 micron, 0.13 micron, or 0.11 micron. However, it would have been an obvious matter of design choice to have the widths of the first and

second electrodes being as those claimed in the pending application, since applicant has not disclosed that such widths solve any stated problem or is for any particular purpose.

Regarding to claim 8, Abraham et al. disclose the polymer memory device comprising all the claimed limitations, except for an array of discrete, spaced-apart polymer structures comprising a polymer selected from $(CH2\text{-}CF2)_n$, $(CHF\text{-}CF2)_n$, $(CF2\text{-}CF2)_n$, α-, β-, γ-, and δ-phases thereof, $(CH2\text{-}CF2)_n$,-$(CHF\text{-}CF2)_m$ copolymer, α-, β-, γ-, and δ-phases thereof, and combinations thereof. However, it would have been obvious to one having ordinary skill in the art at the time the invention was made that such materials are well known polarizable ferroelectric materials used in memory device (see also U.S. Patent No. 5,927,206 to Bacon et al., ***column 5,*** lines 45-57)

Regarding to claim 25, Abraham et al. in view of the above remarks disclose the memory system comprising all the claimed limitations, except for the physical interface configured to a host interface being selected from a PCMCIA card interface, a compact flash card interface, a memory stick-type card interface, a desktop personal computer expansion slot interface, and a removable medium interface. However, it would have been obvious to one having ordinary skill in the art that the interface through which a memory device being in communication with the host could be any type, including those claimed in the pending application, and these types of interfaces depend on the type of the host which the memory being connected to.

7. Claims 4, 5 and 27 are rejected under 35 U.S.C. 103 (a) as being unpatentable over U.S. Patent No. 6,072,718 to Abraham et al. in view of the above remarks and further in view of U.S. Patent No. 5,927,206 to Bacon et al.

Regarding to claims 4, 5, and 27, Abraham et al. disclose the polymer memory device comprising all the claimed limitations, except for a protective film or an organic protective film disposed above and on the electrodes.

Bacon et al. disclose a memory device having an organic protective film disposed above and on the electrodes. See column 5, line 58 to column 6, line 17.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to modify the invention of Abraham et al. to include a protective film as that of Bacon et al., because those skilled in the art will recognize that such modification and variations can be made without departing from the spirit, but also increasing the performance, of the invention of Abraham et al.

8. Claims 9-23 are rejected under 35 U.S.C. 103 (a) as being unpatentable over U.S. Patent Application No. 2002/0093845 by Matsuoka et al., in view of the following remarks.

Regarding to claim 9, Matsuoka et al. discloses a process of forming a memory structure, as shown in figures 21-27, comprising:

first patterning a ferroelectric structure (1004, 19, 1005, 505, figure 23) to match a first wiring layout 1303; and

second patterning the ferroelectric structure (1004, 19, 1005, 505, figure 23) to match a second electrode layout 604 (figure 27). See also paragraphs [0078]-[0080].

Though the first wiring layout 1303 of Matsuoka et al. is a ground line instead of a first electrode or a word line of the memory structure, it would have been obvious to one having ordinary skill in the art at time the invention was made that a word line could absolutely be formed in similar manner, at similar position as those of the ground line in order to form a semiconductor memory device in which a writing word line is formed below a data line as described in paragraphs [0068]-[0073] and figures 9-19 of Matsuoka et al. In addition, it is inherent that the process of Matsuoka et al. could be used to form various type of memory structure with tunnel junction, including polymer memory structure with ferroelectric polymer structure as tunnel junction.

Regarding to claim 10, Matsuoka et al. discloses the process wherein first patterning further comprising patterning the ferroelectric polymer structure (1004, 19, 1005, 505, figure 23) over the first electrode layout 1303 under conditions that substantially cover the first electrode layout and that forms segmented, elongated ferroelectric polymer structures. See figures 23-27.

Regarding to claim 11, Matsuoka et al. discloses the process wherein second patterning further comprising patterning the segmented, elongated ferroelectric polymer

structures by using the second electrode layout as an etch mask. See paragraph [0080].

Regarding to claim 12, Matsuoka et al. discloses the process wherein before first patterning the ferroelectric polymer structure according to the first electrode layout, the process further comprising:

providing a substrate 1704; and

forming the first electrode layout 1303 as a damascene structure in the substrate 1704. See figure 21.

Regarding to claims 13 and 15, Matsuoka et al. discloses the process comprising all the claimed limitation, except for form forming an organic protective film above and on electrode layouts. However, it is well known in the art that in order to avoid external effect to the memory structure, the memory structure should be covered by an insulating protective film.

Regarding to claim 14, Matsuoka et al. discloses the process wherein before first patterning the ferroelectric polymer structure according to the first electrode layout, the process further comprising:

providing a substrate 1704; and

forming the first electrode layout 1303 upon an upper surface of the substrate 1704. See figure 21.

Regarding to claim 16, Matsuoka et al. discloses a process of forming a memory device, as shown in figures 21-27, comprising:

providing a ferroelectric polymer structure (1004, 19, 1005, 505, figure 23) between an array of intersecting lower and upper electrodes 1303, 604;

removing ferroelectric polymer material that is laterally exposed between the array of electrodes. See also the rejection of claim 9 above and paragraphs [0076]-[0080].

Regarding to claim 17, Matsuoka et al. discloses the process wherein providing the ferroelectric polymer structure between an array of intersecting lower and upper electrodes further comprising:

providing a substrate 1704;

forming the lower electrode layout 1303;

forming the ferroelectric polymer structure (1004, 19, 1005, 505, figure 23) over the lower electrode layout 1303;

first patterning the ferroelectric polymer structure (1004, 19, 1005, 505, figure 23) to form segmented, elongated ferroelectric polymer structures; and

forming the upper electrode layout. See figures 21-27.

Regarding to claim 18, Matsuoka et al. discloses the process wherein removing ferroelectric polymer material that is laterally exposed between the array of electrodes further comprising:

first patterning the ferroelectric polymer structure to form segmented, elongated ferroelectric polymer structures; and

second patterning the ferroelectric polymer structure to form discrete, spaced apart ferroelectric polymer structures. See figures 23 and 27.

Regarding to claim 19, Matsuoka et al. discloses the process wherein second patterning further comprising patterning the segmented, elongated ferroelectric polymer structures by using the second electrode layout as an etch mask. See paragraph [0080].

Regarding to claim 20, Matsuoka et al. discloses the process wherein before first patterning the ferroelectric polymer structure according to the first electrode layout, the process further comprising:

providing a substrate 1704; and

forming the lower electrode layout 1303 as a damascene structure in the substrate 1704. See figure 21.

Regarding to claims 21 and 23, Matsuoka et al. discloses the process comprising all the claimed limitation, except for form forming an organic protective film above and

on electrode layouts. However, it is well known in the art that in order to avoid external effect to the memory structure, the memory structure should be covered by an insulating protective film.

Regarding to claim 22, Matsuoká et al. discloses the process wherein before first patterning, the process further comprising:

providing a substrate 1704; and

forming the lower electrode layout 1303 upon an upper surface of the substrate 1704. See figure 21.

Allowable Subject Matter

9. Claims 6, 7, 28, and 29 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims, since the prior art of record and considered pertinent to the applicant's disclosure does not teach or suggest the claimed memory device wherein each electrode in the series of first electrodes being contacted by the ferroclectric polymer structure on three of the four surfaces (claims 6, 28), and wherein the series of first electrodes comprising a damascene structure disposed in a substrate (claims 7, 29).

10. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance".

Conclusion

11. When responding to the office action, Applicants are advised to provide the examiner with the line numbers and page numbers in the application and/or references cited to assist the examiner to locate the appropriate paragraphs.

A shortened statutory period for response to this action is set to expire 3 (three) months and 0 (zero) day from the day of this letter. Failure to respond within the period for response will cause the application to become abandoned (see M.P.E.P 710.02(b)).

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dao H. Nguyen whose telephone number is (703) 305-1957. The examiner can normally be reached on Monday-Friday, 9:00 AM – 6:00 PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms can be reached on (703) 308 - 4910. The fax numbers for Customer Service is (703) 872-9317, for the organization where this application proceeding is assigned is (703) 872-9318 for regular (Before Final) communications or (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

HOAI HO
PRIMARY EXAMINER

Dao H. Nguyen
Art Unit 2818
February 24, 2003